

**Patent Claims**

- Sub A1
1. Process for detecting the phenomenon of fluorescence in a microscope, wherein the sample is irradiated by a modulated and / or pulsed laser light source, and the fluorescence is detected at least in two different phase positions of the detector.
  2. Process, as claimed in claim 1, wherein an image is produced for each phase position.
  3. Process, as claimed in at least one of the preceding claims, wherein the generated images or the images, calculated from these images, are displayed on a monitor.
  4. Process, as claimed in at least one of the preceding claims, wherein the illumination and the detection take place by way of a laser scanning microscope.
  5. Process, as claimed in at least one of the preceding claims, wherein the detection takes places with a modulatable PMT.
  6. Process for detecting the phenomenon of fluorescence in a microscope, wherein the sample is irradiated by a modulated and / or pulsed laser light source, wherein a reference signal, corresponding to the modulated and / or pulsed laser, and a measurement signal, corresponding to a modulated detection, are multiplied together with a fixed variable phase relation; and the result serves to display the image.

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7.

Process, as claimed in claim 6, wherein the phase relation is adjusted in such a manner that the phase shift is zero.

8.

Process, as claimed in any of the claims 6 or 7, with non-descanned detection.

9.

Application of a process, according to any one of the preceding claims, to the multiphoton excitation of fluorescence emission, in particular two photon excitation.

10.

Process, as claimed in any one of the preceding claims, with the use of a cw laser, modulated by means of an acousto-optical modulator (AOM).

11.

Process, as claimed in any one of the preceding claims, with the use of a cw laser, modulated by means of a Pockel cell.

12.

Process, as claimed in any one of the preceding claims, with the use of a pulse laser, which is additionally modulated.

13.

Process, as claimed in any one of the preceding claims, with the use of a pulse laser, which is additionally modulated by means of an AOM.

14.

Process, as claimed in any one of the preceding claims, with the use of a pulse laser, which is additionally modulated by means of a Pockel cell.

15.

Process, as claimed in any one of the preceding claims, for use for time resolution of multiphoton processes, like second harmonic generation on surfaces or two photon excitation.

16.

Process, as claimed in any one of the preceding claims, with the use of a pulsed near infrared (NIR) laser.

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17.

Process, as claimed in any one of the preceding claims, with the use of a pulsed near infrared (NIR) laser with downstream frequency conversion to 1 photon excitation.

18.

Process, as claimed in any one of the preceding claims, with the use of a pulsed near infrared (NIR) laser with downstream frequency conversion to 1 photon excitation of fluorescence.

19.

Process, as claimed in any one of the preceding claims, with the use of phase sensitive detection for improving the signal to noise ratio.

*Add R2*